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An undescribed collembolan species swarming on the Peloponnese (Greece)

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Abstract. *Hypogastrura peloponnesica* sp. n. is described from the Menalo Mountains situated on the Peloponnese, Greece, where it has been found swarming among melting snow patches. With a prominent tubercle fronto-lateral of seta sd1 on each side of the head the new species is most similar to *Hypogastrura tooliki* Fjellberg, 1985 from Alaska. The two species can be distinguished by the shape of the maxillae, the relative size of the postantennal organs, the number of ventral tube setae and the size of the basal papillae of the anal spines.

Keywords. Collembola, Hypogastruridae, new species, Greece.

INTRODUCTION

The Balkan Peninsula is the most underrepresented region in Europe considering faunistical research, although an extremely high level of biodiversity has already been demonstrated (Kryštufek & Reed 2004). On one hand, environmental stability and topographic diversity, typical for the Balkans could have contributed to this richness. On the other hand, its location on the Southeastern part of the continent made the region an important refugium for forest communities and associated fauna during the Pleistocene (Kryštufek & Reed 2004).

Investigation of the fauna in this geographical unit was one of the main projects of the Hungarian Natural History Museum (HNHM) in recent years (e.g. Dányi 2010, Fehér *et al*. 2009, Kontschán 2009, 2010, Korsós *et al*. 2008, Mahunka & Mahunka-Papp 2010, Murányi 2007, 2008, Szederjesi & Csuzdi 2012a, 2012b, Ujvári 2011, etc.). The present paper is an outcome of collembolan studies within this framework.

The cosmopolitan genus *Hypogastrura* Bourlet, 1839, the largest genus of the family Hypogastruridae, currently comprises 164 species (Bellinger *et al*. 2012). Many species have been described or revised just recently (e.g. Fanciulli & Dallai 2008, Jiang & Chen 2008, Jiang & Yin 2010, 2012, Skarżyński 2006a, 2006b, 2007, 2009, 2010, Skarżyński & Kaprus 2009, Skarżyński & Smolis 2003). During a collection trip to the Peloponnese thousands of specimens of a *Hypogastrura* species have been found swarming on the Menalo Mts. among melting snow patches (Figs 1–3). They turned out to represent a species new to science.

MATERIALS AND METHODS

The collembolans were collected by a mouth-operated aspirator and preserved in 75% ethanol. For light microscopy, the specimens were depigmented with Hüther's fluid, cleared in a mixture of lactic acid and glycerol (3:1), and examined under a Leica DM 1000 microscope with phase contrast optics. Line drawings were prepared with a drawing tube. Hoyer's medium was used for permanent mounts. For SEM, the specimens were critical point dried, coated with gold-palladium and digitally photographed using a HITACHI S-2600N scanning electron microscope.

All material is deposited in the Soil Zoology Collection of the Hungarian Natural History Museum in Budapest.

The terminology follows Fjellberg (1984, 1999), Babenko *et al*. (1994), and Thibaud *et al*. (2004). Abbreviations: ant. I–IV—antennal segments I–IV, th. I–III—thoracic terga I–III, abd. I–VI—abdominal terga I–VI.

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Figures 1–3. *Hypogastrura peloponnesica* sp. n., 1 = collecting locality, 2–3 = swarming specimens.

Hypogastrura peloponnesica sp. nov.

(Figs 1–29)

Diagnosis. Body length 1.0–1.75 mm. Granulation fine and uniform (Figs 4–5), 10–11 granules between setae p1 on abd. V. Labrum with four apical folds among five papillae. Maxilla of *notha* type. Maxillary outer lobe with 2 sublobal hairs. Labium of *tullbergi* type. Ant. IV with simple apical vesicle, 6 (3 lateral, 3 dorsal) curved, long and moderately thick sensilla and up to 18 short, pointed, erect sensilla in the ventral file. Ant. I with 8 setae. Ocelli 8 + 8. Postantennal organ 1.3–1.5 times larger than neighbouring ocelli, with 4 lobes (anterior pair slightly enlarged), without accessory boss. Head with 3 + 3 ventral setae and a prominent tubercle frontolateral of each seta sd1. Th. I with 3 + 3 setae. Anal spines very small, on very low papillae. One clavate tenent hair on each leg. Ventral tube with 4 + 4 setae. Dens dorsally with 7 setae, with tooth-like granules on the distal part and with a ventroapical hyaline area. Mucro with a broad lateral lamella and a distinct subapical tooth. Tenaculum with 4 + 4 teeth.

Material examined. Holotype female (HNHM coll-795). Greece, 2009/53, Arkadia county, Menalo Mts, limestone rocks under Mt. Mavri Korifi, 1615m, N37°39.565' E22°15.582' leg. Dányi–Kontschán–Murányi, 06.04.2009. *Paratypes*. 3 males and 4 females (HNHM coll-796): same data as the holotype. *Other material*. 72 specimens (HNHM coll-797); 1 male, 1 female (HNHM collpr-418); 2 females (HNHM collpr-419); 2 females (HNHM coll-420); female (HNHM collpr-426 (head) and HNHM collpr-427 (body)); female (HNHM collpr-430 (head) and HNHM collpr-431 (body)); female (HNHM collpr-432 (head) and HNHM collpr-433 (body)): same data as the holotype.

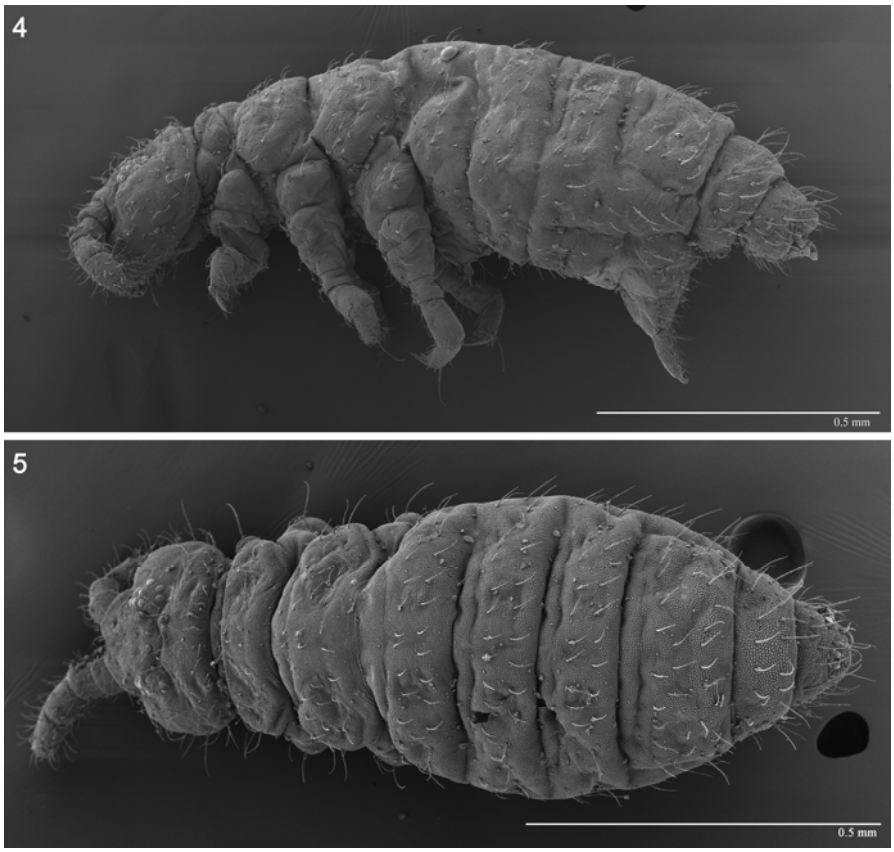
Description. Body length 1.0–1.75 mm. Body colour bluish in living specimens (Figs 2–3), brownish-black in alcohol. Granulation fine and uniform (Figs 4–5), 10–11 granules between setae p1 on abd. V (Figs 5, 22).

Ant. IV with simple apical vesicle, subapical organite (or), microsensillum (ms), 6 (3 lateral, 3 dorsal) curved long and moderately thick sensilla (Fig. 13) and up to 18 short, pointed, erect sensilla in the ventral file. Ant. III organ with two long (lateral) and two short (internal) curved sensilla (Figs 13–14). Microsensillum on ant. III present (Fig. 14). Ant. I with 8 setae (Fig. 15).

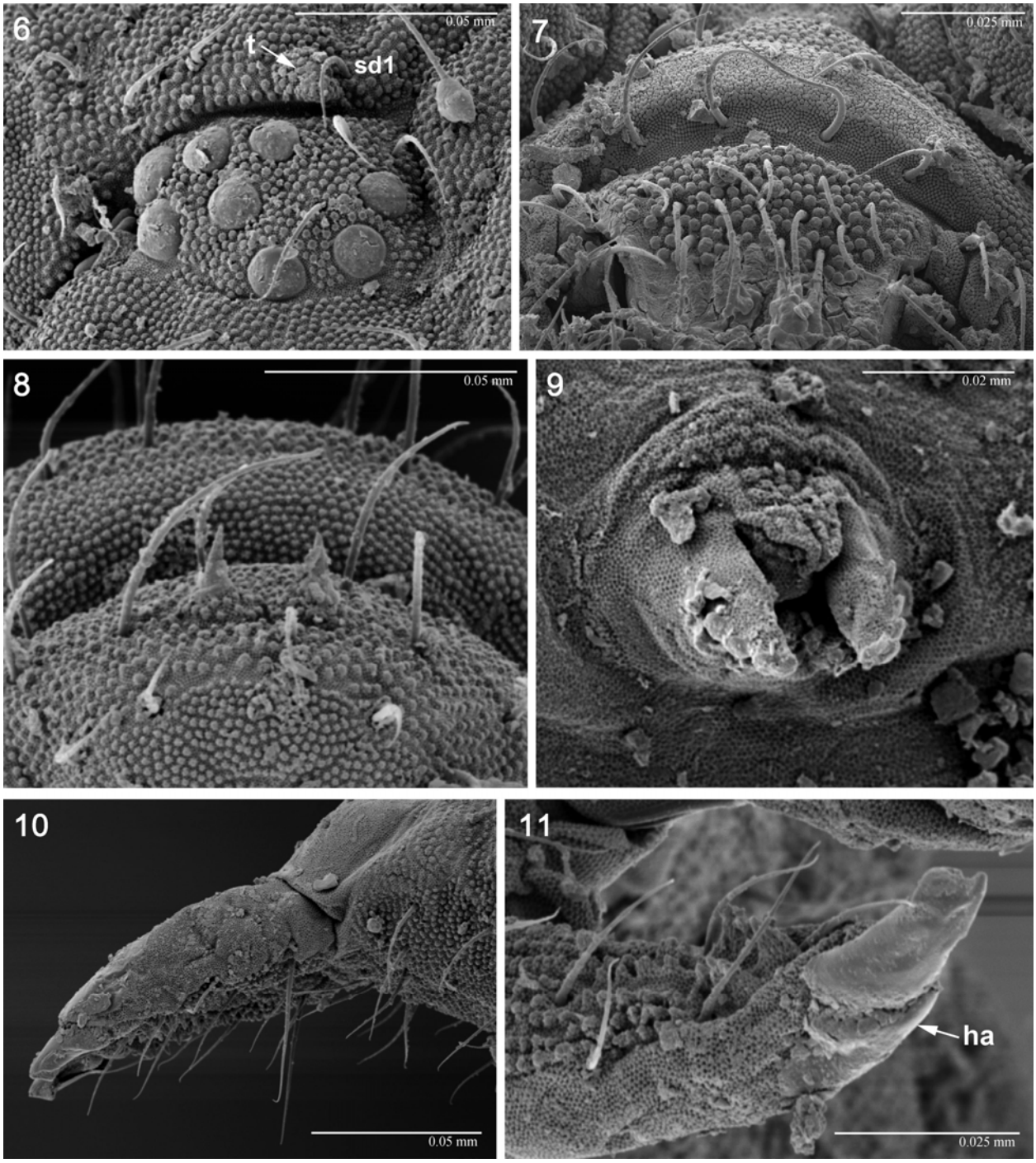
Ocelli 8 + 8. Postantennal organ 1.3–1.5 times larger than neighbouring ocelli, with 4 lobes, anterior pair slightly enlarged (Figs 6, 17). Accessory boss invisible.

Dorsal chaetotaxy of head typical of the genus. Head with 3 + 3 ventral setae and with a prominent tubercle on each side between seta sd1 and next ocellus (Figs 6, 16).

Labrum with 5, 5, 4 setae, 4 prelabrals, and 4 apical folds among 5 distal papillae (Figs 7, 18). Head of maxilla of the *notha* type (Fig. 20) (Fjellberg 1984). Maxillary outer lobe with 2 sublobal hairs (Fig. 19). Labium of the *tullbergi* type (Fjellberg 1999).



Figures 4–5. *Hypogastrura peloponnesica* sp. n., habitus, 4 = lateral view, 5 = dorsal view



Figures 6–11. *Hypogastrura peloponnesica* sp. n., 6 = left side of ocular area and the tubercle (t) above it, 7 = labrum, 8 = anal spines (caudal view), 9 = tenaculum, 10 = furca, 11 = mucro and distal part of dens (ventrolateral view) (ha = ventroapical hyaline area)

Dorsal chaetotaxy of thorax and abdomen as in Figs 4–5, 12, 21–22. Dorsal setae short, thin, acuminate, slightly differentiated, longest setae of larger specimens slightly serrated. Trunk sensilla (s) of similar size or slightly longer than surrounding setae, smooth (Figs 4–5, 12, 21–22). Th. I with 3 + 3 setae. Setae a2 and m3 on abd. IV sometimes missing asymmetrically. Subcoxae I–III with 1, 2, 3 setae respectively.

Anal spines very short, straight, or very slightly curved, inserted on very low basal papillae of about half the height of the spines (Figs 4–5, 8, 23).

Tibiotarsi I–III with 19, 19, 18 setae respecttively, one clavate tenent hair (A1 according to the nomenclature of Lawrence (1977)) on each leg. Tenent hairs longer than claws (Fig. 24), with some variability in length (reaching from 2/3 to the tip of the unguis). Claws with a small inner tooth in the distal half, and a small lateral tooth (Fig. 24). Empodial appendage with a broad basal lamella and an apical filament reaching about 2/3 of inner edge of unguis (Fig. 24).

Ventral tube short, with 4 + 4 setae (Fig. 26). Tenaculum with 4 + 4 teeth (Figs 9, 25).

Furca well developed (Fig. 4). Manubrium with 10 + 10 dorsal setae. Dens with 7 dorsal setae, fine granulation, and a number of subapical conical teeth (4–7 strong, 4–7 somewhat smaller) (Figs 4, 10–11, 27–29). Ventroapical third to half of the dens smooth, without granulation (Figs 10–11) (ventroapical hyaline area according to the terminology of Skarżyński & Smolis (2003)), in some specimens discretely swollen. Mucro wide, 1/3–1/4 as long as dens, with a broad outer lamella and with a distinct subapical tooth (Figs 10–11, 27–29).

Etymology. The name of the new species refers to the geographic region (Peloponnese) where it was collected.

Ecology. Found in a patchy habitat of alpine meadows and *Abies cephalonica* stands (Fig. 1), swarming under limestone rocks at snowmelt (Figs 2–3).

DISCUSSION

The new species is most similar to *H. tooliki* Fjellberg, 1985, which is the only other known *Hypogastrura* with a prominent tubercle on each side of the head. The two species can be distinguished by the morphology of the maxilla (*notha* type in *peloponnesica*, *tullbergi* type in *tooliki* (Fjellberg 1984)), by the height of the anal spine papillae (very low in *peloponnesica*, high in *tooliki*), by the relative size of the postantennal organ (1.3–1.5 times larger (*peloponnesica*) vs. slightly smaller (*tooliki*) than neighbouring ocelli), and by the number of setae on the ventral tube (4 + 4 in *peloponnesica* and typically 5 + 5 in *tooliki*).

H. tooliki belongs to the Nearctic *H. nivicola* (Fitch, 1847) species group (all grouping sensu Skarżyński 2009). Within this and the closely related Palaearctic *H. socialis* (Uzel, 1891) group, the new species shares the *notha* type maxilla only with *H. packardi* (Folsom, 1902) from which it differs in the anal spines (very small in *peloponnesica*, strong in *packardi*) and in the number of sensilla on ant. IV (6 in *peloponnesica*, 8–9 in *packardi*).

With the relatively large postantennal organ, *peloponnesica* differs from all other members of the *nivicola/socialis* groups and resembles species of the *H. monticola* Stach, 1946 group, particularly *H. hatiparae* Babenko, 1994, *H. dasiensis* Selga, 1966 and *H. subpapillata* Babenko, 1994. Differences are apparent in the body granulation (fine in *peloponnesica*, coarse in the other three species), in the dorsal chaetotaxy (m setae on abd. V absent in *peloponnesica*, present in the other three species), in the maxilla (*notha* type in *peloponnesica*, *tullbergi* type in *hatiparae* and *subpapillata*, unknown in *dasiensis*), and in the number of sensilla on ant. IV (6 in *peloponnesica*, 5 in *subpapillata* and *dasiensis*).

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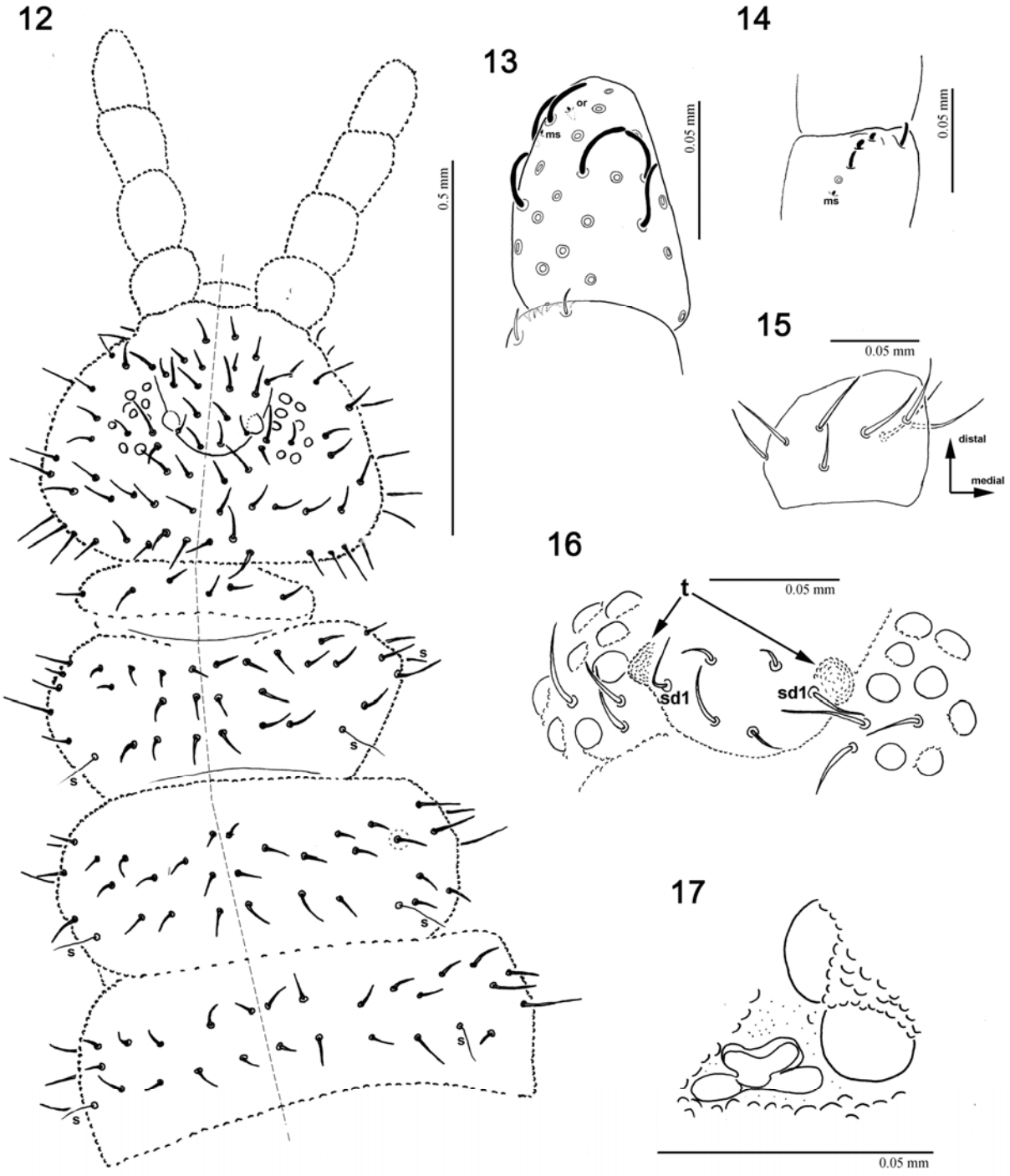
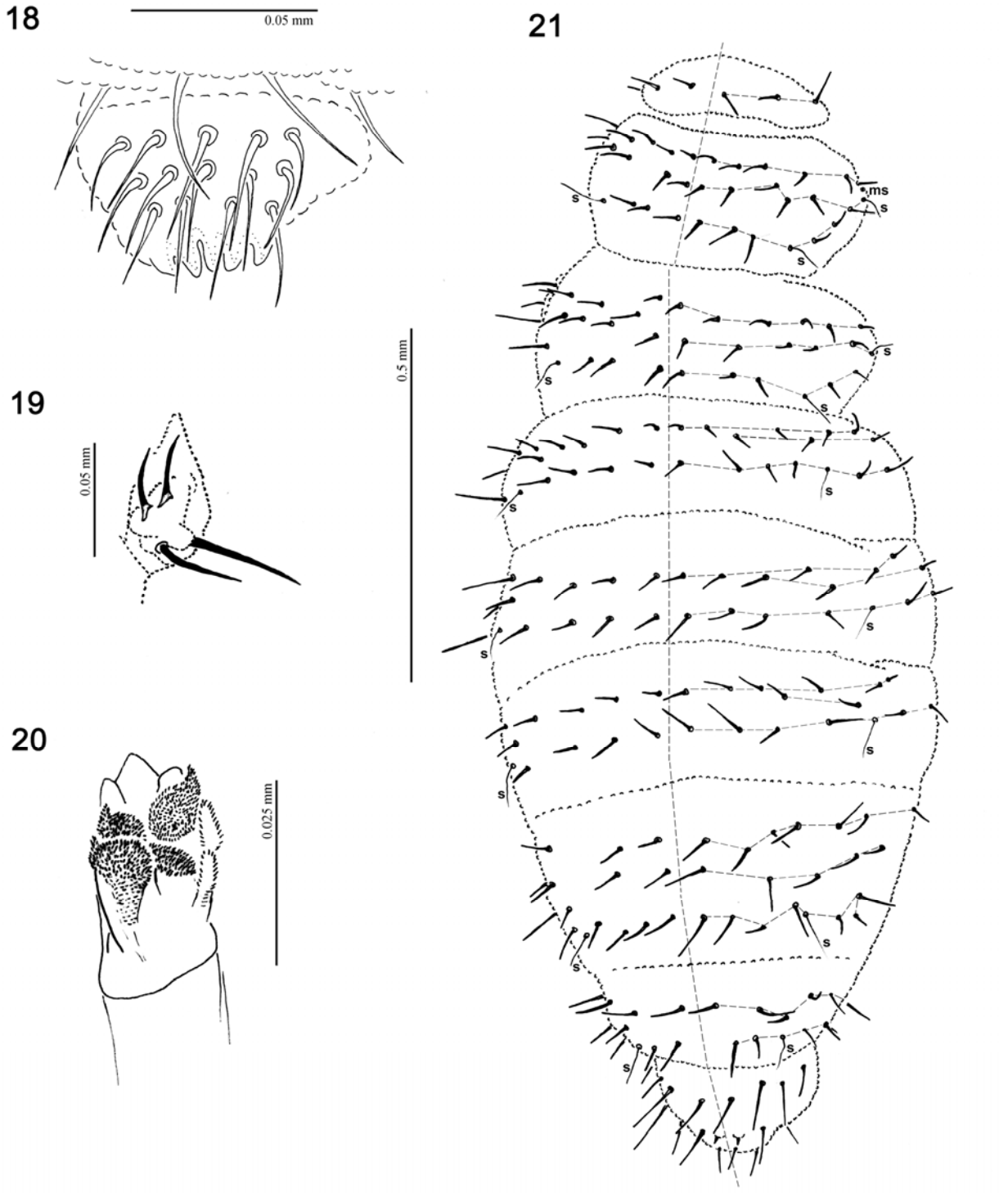
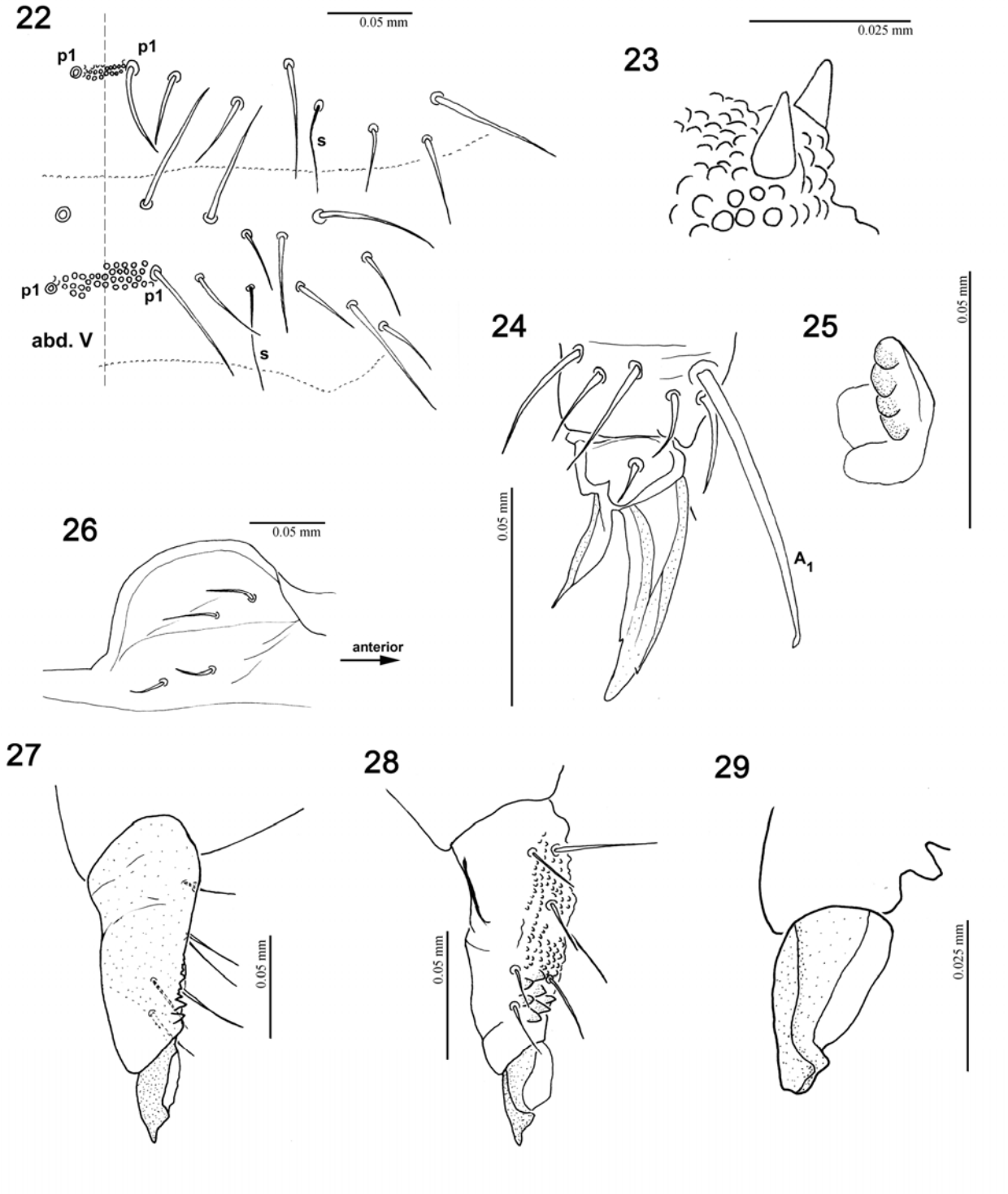


Figures 12–17. *Hypogastrura peloponnesica* sp. n., 12 = chaetotaxy of head, th. I–III and abd. I, 13 = chaetotaxy of ant. IV and distal ant. III (dorsal view) (or = subapical organite, ms = microsensillum), 14 = ant. III organ (ms = microsensillum), 15 = chaetotaxy of ant. I, 16 = ocelar fields and the prominent tubercles (t), 17 = postantennal organ and neighbour ocelli.



Figures 18–21. *Hypogastrura peloponnesica* sp. n., 18 = labrum, 19 = maxillary outer lobe, 20 = head of maxilla, 21 = chaetotaxy of body.



Figures 22–29. *Hypogastrura peloponnesica* sp. n., 22 = dorsal chaetotaxy of abd. V and p row of abd. IV, 23 = anal spines (dorsolateral view), 24 = tibiotarsus III, claw and empodial appendage, 25 = tenaculum, 26 = ventral tube, 27 = furca (lateral view), 28 = furca (caudomedial view), 29 = mucro (caudomedial view).

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